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NOTES ON PHYSIDAE WITH DESCRIPTIONS
OF NEW SPECIES.

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WILLIAM TURTON (1807, p. 169) in his catalogue published a description of *Bulla rivalis*. According to Kennard and Woodward (1926, p. 99) Turton obtained the diagnosis and the name of this species from Maton and Rackett (1807, p. 126) in a paper which had been presented to the Society three years before it was published. Their locality citation is Hampshire, England. Both made the same reference to Chemnitz (1786, vol. 9, pl. 103, fig. 877-878) which is listed as *Bulla fontinalis* Linné. On the same plate two additional figures of *Physa* are given (fig. 879-880) with a caption of *Bulla fontinalis Indiae Occidentalis*. Hence the original diagnosis was assumed to be wrong by many subsequent writers and the species credited to the West Indies. Kennard and Woodward (1926, p. 99) have given a complete synonymy for this species, recognizing it as a British form. Unfortunately, however, they have included in their synonymy a large number of North American species of *Physa* with no reasons stated for so doing. It is quite impossible to understand why two distinctive species as *Physa osculans* and *P. heterostropha* should be synonymized under any European species of *Physa*.

The non-recognition of *B. rivalis* Turton by British scientists as a local species seems to be fair proof that it has no value whatsoever and is at best only an ecological form of the well known European *Physa fontinalis* Linné. Adding this species to the synonymy of *Physa fontinalis*, does not mean that the list of synonyms appended by Kennard and Woodward (1926, p. 99-100) to *P. rivalis* should be carried over at all. Many of their so-called synonyms are recognizable species.

Chemnitz's name being non-binomial cannot stand. Sowerby (1822) lists *Limnea (Physa) rivalis* as 'a species which has been admitted into the English catalogue, but we only know it to be found in Guadaloupe.' Subsequent authors have credited *rivalis* to Sowerby on the basis of this work. The figures given by Sowerby are excellent and as this constitutes the first recognizable figure of the West Indian form (in lieu of any description), the species really dates from Sowerby, but the name, of course, must be tabled as a homonym. The younger Sowerby (1873, species no. 31) also added to the confusion by quoting the earlier Sowerby, as to the name *P. rivalis*, but giving an entirely new locality, namely, Columbia River. This error was later copied by Clessin (1886, p. 331) who regarded *P. rivalis* as a good species, though elsewhere (1886, p. 281) he treats it as a synonym of *P. sowerbyana*, referring in both cases to the same figure contained in *The Genera of Recent and Fossil Shells*. The first available name for this West Indian form seems to be *Physa marmorata* Guilding. The synonymy would then be as follows:

Physa marmorata Guilding.

- 1822 *Limnea (Physa) rivalis* Sby., *Genera of Recent and Fossil Shells*. London, *Limnea. non Bulla rivalis* Turton, *British Fauna*, p. 169, 1807; *non Bulla rivalis* Mat. and Rack., p. 126, 1807; *non Physa rivalis* Potiez and Michaud, *Galerie des Mollusques*, vol. 1, p. 226, pl. 22, fig. 21-22, 1838.
- 1828 *Physa marmorata* Guilding, *Zoological Journal*, vol. 3, p. 534.
- 1845 *Physa brasiliensis* 'Koch', *Phil.-Conch. Cab. (2)*, vol. 1, pt. 17, p. 10, pl. 1, fig. 18.

The distribution of *Physa marmorata* Gld. seems to be quite general as it is known from several of the Lesser Antilles and the northeastern part of South America. The following records are known (all being listed as *P. rivalis* Mat. and Rack.): Trinidad, (Guppy); Brighton, Grenada (E. A. Smith); Antigua (Pilsbry and Brown); St. Thomas (E. A. Smith); Para, Papary Lake and Ceara-Mirim, all in Brazil (Fred Baker).

This species is quite possibly a member of the genus *Aplexa*. Shell characters alone, however, are not sufficiently diagnostic

to render its exact determination possible. Irrespective, however, of its generic placement, the specific name will remain the same, as Sowerby's *rivalis* was listed as a *Physa*.

Fred Baker (1914, p. 661) records *P. sowerbyana* Orb. as a synonym of *P. rivalis* Mat. and Rack. A careful study of both figures and specimens separates these forms as quite distinct and demonstrates that *P. sowerbyana* is certainly a true *Physa* while *P. rivalis* (= *marmorata*), as stated above, is possibly an *Aplexa*.

H. B. Baker (1930, p. 36) in a recent publication on Venezuelan Mollusca has treated *Bulla rivalis* Mat. and Rack. as an *Aplexa* and has considered it as a member of the South American fauna. The citation of Hampshire, England, as the type locality by these authors precludes any assumption that their species was anything else other than British. This form considered by Baker is apparently *Aplexa peruviana* Gray.

P. rivalis Pot. and Mich. is a synonym of *Aplexa peruviana* Gray, the figures given by these authors being practically the same. The following synonymy is given for the Peruvian species:

Aplexa peruviana Gray.

- 1828 *Physa peruviana* Gray, Spic. Zool. pt. 1, p. 5, pl. 6, fig. 10. Between Lima and Callao.
- 1838 *Physa rivalis* Pot. and Mich., Gal. des Moll., Paris, vol. 1, pl. 22, fig. 21-22, p. 226; non *B. rivalis* Turton; non *B. rivalis* Mat. and Rack.; non *P. rivalis* Sby.
- 1839 *Physa peruviensis* 'Muhlfeldt', Anton, Verzeichniss der Conchylien welche sich in der Sammlung von H. E. Anton befinden, Halle no. 1785.¹
- 1845 *Physa antonii* Küster, Conch. Cab., vol. 1, pl. 17, p. 11, pl. 2, fig. 6-8.
- 1887 *Aplecta carolita* Joussemaue, Bull. Soc. Zool. France, vol. 12, p. 184, pl. 3, fig. 5.
- 1887 *Aplecta martinidella* Cousin, Bull. Soc. Zool. France, vol. 12, p. 262, pl. 3, fig. 5. (*Nomen nudum* referring to the figure of *carolita*.)

¹ I have been unable to see this paper, but the same species with the name changed to *P. antonii* is described and figured by Küster in the *Conchylien Cabinet*.

1930 *Aplexa rivalis rivalis* Mat. and Rack., Baker, H. B.,
Occas. Papers Mus. of Zool. Univ. Michigan 210, p. 36.

An examination of several lots of *Physa*, distributed by local collectors as *P. heterostropha acuta* Drap. from southern California agree in description and figure with *P. osculans* Hald. described from Mexico. The name *P. fontinalis acuta* (Drap.) was first used by Hannibal (1912, p. 164) in an all inclusive synonymic grouping of the American Physidae.

The name *P. heterostropha acuta* appeared later as a modification of Hannibal's grouping. Hannibal's work has no basis of fact upon which to stand.

Haldeman first published *P. osculans* (1843, p. 29, pl. 2, fig. 11-13) with three figures. His figure 13, in the original diagnosis was said to probably be another species. Binney (1865, p. 83) in error, considering Haldeman's figures 11 and 12 to be *P. heterostropha*, assigned figure 13 to *osculans*. Fischer and Crosse (1886, p. 101) likewise noted the discrepancy in Haldeman's figures, assigning a new name for figure 11 (*conoidea*), limiting *P. osculans* to figure 12, but putting it in the synonymy of *P. mexicana* Phil. and definitely assigning figure 13 to the genus *Aplexa*, the species probably being *A. nitens* Phil.

A careful comparison of figures bears out these contentions that Haldeman's figure 13 is *Aplexa nitens*, but in regard to *P. osculans*, this name has priority of two years over that of *P. mexicana* Phil. Pilsbry (1891, p. 323) pointed out that *P. boucardi* C. and F. is also a synonym of *P. osculans*. The following is a résumé of the above, using Haldeman's plate figures for the final assortment of forms.

Physa osculans Haldeman.

- 1843 *Physa osculans* Haldeman, Mono. Limniades, pt. 6, p. 29, pl. 2, fig. 12.
1845 *Physa mexicana* Phil., Conch. Cab., vol. 1, pt. 17, p. 5, pl. 1, fig. 3-4.
1881 *Physa boucardi* C. and F., Journ. de Conch., vol. 29, p. 334; Miss. Sci. Mex., Moll. vol. 2, p. 102, pl. 30, fig. 4-4a.

- 1912 *Physa fontinalis scuta* (Drap.), Hannibal, Proc. Mala. Soc. vol. 10, p. 164 (part).

Physa conoidea C. and F.

- 1843 *Physa osculans* Haldeman (part), Mono. Limniades, pt. 6, pl. 2, fig. 11.
 1886 *Physa mexicana conoidea* C. and F., Miss. Sci. Mex., Moll. vol. 2, p. 101, pl. 39, fig. 8-8a.

Aplexa nitens Phil.

- 1837 *Aplexa suturalis* Beck, Index Moll., p. 117 (*nomen nudum*).
 1843 *Physa osculans* Haldeman (part), Mono. Limniades, pt. 6, pl. 2, fig. 13.
 1845 *Physa nitens* Phil., Conch. Cab. (2), vol. 1, pt. 17, p. 5, pl. 1, fig. 1-2.
 1886 *Aplecta nitens* Phil., Miss. Sci. Mex., Moll. vol. 2, p. 88, pl. 39, fig. 1a-1b.

F. C. Baker (1926, p. 197) in a revisional paper on some fresh water shells proposed that the name *Physella* Haldeman (1843, p. 38) should replace the name *Physa* in North America on the grounds that the North American forms differed anatomically from the European. Baker emended Haldeman's description, selecting the same type *Physa* (*Physella*) *globosa* Haldeman. An examination of the original specimens of Haldeman shows them to be materially different from any other known American *Physa*. As mentioned by Pilsbry (1925, p. 326) the nearest species in size and general form is that of *Physa* (*Petrophysa*) *zionis* Pils. Both of these species occupy very unusual habits. *P. globosa* is found on submerged rocks in the rapids at the mouth of the Nolachucky River in eastern Tennessee. *P. zionis* lives on the vertical canyon walls with algae in the seepage water of springs. This last species is from Zion Canyon, Zion National Park, Utah.

The specimens of *P. globosa* described by Haldeman are adult and as stated above differ materially from any other known form. For this reason Baker is in error in his use of the name *Physella*, which must be retained only for the single species

Physa (*Physella*) *globosa*, and not be used in the generic sense for many of the North American forms. The anatomy is still unknown, the two specimens of the original series are the only ones that have ever been found.

Haldeman's name *Physodon* (1843, p. 39) and its emendation by Baker is untenable for subgeneric use as the main character for which the name was established, on the presence of columellar teeth, is not a constant character at all and at best can only be considered of specific value. An examination of several hundred specimens from one locality of *P. microstoma* the type of *Physodon*, shows this character to be present in only a comparatively few individuals. Specimens of this species from other localities are entirely without the character.

Anatomically, there seems to be no justification as yet, to split this genus into groups worthy of generic or subgeneric headings other than *P. globosa* and *P. zionis*. By this is meant the forms that are normally associated with *P. fontinalis* (Linné) of Europe and *P. heterostropha* (Say) of North America. The elaboration of mantle digitations in *Physa fontinalis* (Linné) does not, in my opinion, constitute sufficient grounds to separate all North American forms when this same character, though less developed, in the American forms is stated by Baker (1928, p. 409) to be 'not constant enough to furnish criteria for specific determination.' Emendations of previous names, especially when such are *not* based on the original material are prone to lead to serious errors. Observations made by different authors on the same material or the same species adds materially to the sum of knowledge, but assumptions with no supporting facts lead to trouble and confusion. The emendations made by Baker cannot validate these names when their establishment in the first place was based, as with *Physella*, upon a species, the shell of which is absolutely different from all other *Physas* and with *Physodon* upon a character inconsistent within the species itself.

The subgenus *Alampetis* was proposed by von Martens (1898, p. 368) the type selected being *P. osculans* Hald. (first species under this name in his monograph), though he specifically mentions *P. ancillaria* Say as belonging to this subgenus as well. The main character upon which this subgenus was erected was that of a smooth surface as compared with a glossy surface as

exhibited by *P. fontinalis*. If such be held to be of taxonomic value, the species *Physa gyrina* Say could be classified under two subgeneric headings, as forms of this species, even from a single locality, exhibit both a dull and shining surface, due to the presence or absence of sculpture. This is also true of several other American species. With our present knowledge of these forms it seems best to relegate this name to the synonymy of *Physa*. If, however, the American forms must be placed in a different genus from the European for no other reason than that they happen to occupy two different continents, the name *Alampetis* would replace *Physella* Baker as it has twenty-six years' priority. The names would then stand as follows:

Alampetis v. Martens 1898, synonym of *Physa* Drap.

Petrophysa Pilsbry 1925, as a subgenus, type *P. zionis* Pilsbry.

Physella Baker 1926, synonym of *Physa* Drap.

Physella Haldeman 1843, as a subgenus, type *P. globosa* Hald.

Physodon Baker 1926, synonym of *Physa* Drap.

Physodon Haldeman 1843, synonym of *Physa* Drap.

F. C. Baker (1928, p. 408) has stated in very broad terms the distribution of the family Physidae as follows: 'Distribution: North America, Europe, Asia, East Indies, Africa, Madagascar, New Caledonia, Australia.'

Chamberlin and Jones (1929, p. 158) in their descriptive catalogue of Utah mollusks evidently obtained their information from Baker by stating the distribution of Physidae as follows: 'A nearly cosmopolitan family absent, however, from South America.'

It is exceedingly unfortunate that the above statements are on published record. Such general remarks are copied by zoogeographers and incorporated into papers dealing with the distribution of animals and inferences drawn which are not in accord with the facts. Representatives of Physidae are known from North America, Central America, South America, and the West Indies. They are also common in Europe and are *possibly* found across northern Asia. They are entirely absent from southern Asia, the East Indies, Madagascar, New Caledonia, and Australia. In Africa they are limited to the northern part,

which in reality is part of the south European fauna. Thiele's central African record is still open to question.

The omission of South America by Baker was assumed by Chamberlin and Jones to mean that Physidae was absent from there. South America has a large number of species of this family.

Cockerell (1929, p. 379) has recently recorded that 'New Caledonia is very rich in species of the genus *Physa*, and those I collected have a very ordinary appearance so far as can be seen from the shell One of the New Caledonian species, *Physa ventricosa* of Gassies, has been referred to *Bulinus*, which has nothing to do with true *Physa*.'

So far all New Caledonian forms investigated (both shell and soft parts) as well as material from other sources in the southern Pacific have proven to be *Bulinus* and not *Physa*. E. von Martens (1897, p. 6) stated that all of the forms from the East Indies and southern Pacific islands described as *Physa* were probably *Isidora* (= *Bulinus*). Suter (1913, p. 610) in his manual followed von Martens adding several other localities as areas from which the family Physidae is absent.

Physa distorta Haldeman.

Physa distorta Haldeman, originally described from Ohio, seems to be without much question the southern European *Bulinus contortus* Mich. An examination of the types with specimens of *B. contorta* contained in the collection at the Academy of Natural Sciences of Philadelphia shows them to be the same. The types are umbilicated as stated by Haldeman, a character not possessed by any known *Physa*. Haldeman also placed *P. distorta* in the subgenus *Diastrophia* Gray (now a synonym of *Bulinus*) which had as its type *Physa* (= *Bulinus*) *contorta* Mich.

1840 *Physa distorta* Haldeman, Supplement to Mono. Freshwater Univalve Moll. p. 2; *P. (Diastrophia) distorta* Haldeman, Mono. Freshwater Univalve Moll., 'Physidae', p. 35, 1843.

Physa hawnii Lea.

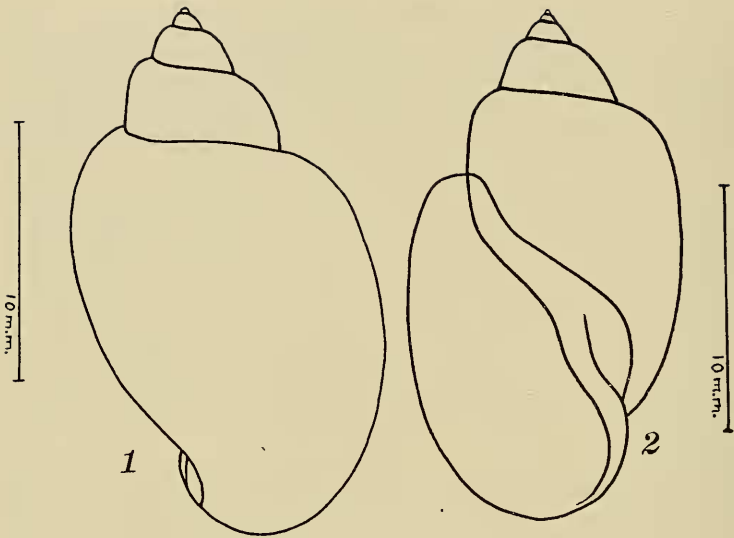
Physa hawnii was originally described from Verdigris River, Kansas. Under this name it has seemed to have remained entirely unknown. It has been known best as *P. albofilata*, a form of the same species from northern Arkansas. F. C. Baker (1928, p. 453) is certainly correct in placing *P. albofilata* in the synonymy of *P. hawnii*. They are practically identical in all characters. *Physa albofilata* was never described. Named by Ancey, then communicated to Sampson, it was distributed as such for many years. The casual remarks about its affinities (Sampson, *loc. cit.*) cannot be construed as constituting a description. *P. hawnii* is, however, quite separable from *P. gyrina* Say and should not be considered a variety of it as listed by Baker.

- 1864 *Physa hawnii* Lea, Proc. Acad. Nat. Sci. Phila. for 1864, p. 115; Journ. Acad. Nat. Sci. Phila. vol. 6, p. 165, pl. 24, fig. 84, 1866; Observations, vol. 2, p. 121, pl. 24, fig. 84, 1867.
- 1894 *Physa albofilata* 'Ancey' Sampson, Arkansas Geol. Surv., vol. 2, of Rep. for 1891, p. 194.
- 1901 *Physa gyrina albofilata* Sampson, Crandall, Nautilus vol. 15, p. 54.
- 1928 *Physella gyrina hawnii* Lea, Baker, Bull. 70, Wisconsin Geol. Nat. Hist. Surv. pt. 1, p. 453.

Physa salina, sp. nov.

Fig. 1 and 2.

Description.—Shell sinistral, imperforate, rather large and elongate, medium heavy. Color, light yellowish brown. Whorls 5, rather flat; body whorl very large, nuclear whorl deep reddish brown and smooth. Spire produced. Aperture elongate-ovate, flaring basally. Palatal lip marginate. Parietal lip of only a thin callous on the body whorl. Columella heavy, twisted, and folded back over the inner side of the lip. Sutures very deeply impressed and sharply indented. Sculpture of very fine cross striae. Axial riblets occasionally produced by the grouping of several very fine axial lines.

FIG. 1 AND 2. *Physa salina* Clench.

Measurements

Length	Width	Ap. Length	Ap. Width	
20.5	11.	14.	6.5 mm.	Holotype
22.	12.	14.5	7.	Paratype
21.	11.	14.	7.5	"
19.	10.	13.	7.	"
21.	10.5	13.	6.5	"

Holotype.—M. C. Z. no. 79387; collected at a brackish spring, Skeen's Ranch, Promontory, Box Elder Co., Utah, in 1877. R. E. Call Collection.

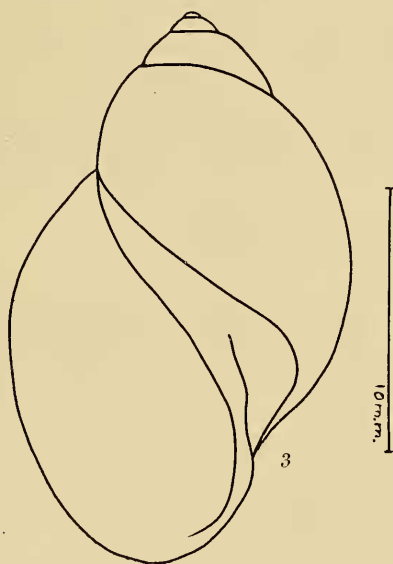
Paratypes.—M. C. Z. no. 4239; data same as for holotype.

Remarks.—This species is in all probability an offshoot of *P. smithiana* stock and can be placed after this species. Though slightly striate, it has nothing in common with *P. virgata* other than this character. *P. salina* is quite remarkable for possessing such straight sided whorls, and having very deeply indented sutures. This last character is not exceeded or even equalled by any other species of *Physa* known to me. Its straight sided whorls are quite similar to those produced in certain species of the genus *Bulinus*, especially *B. contortus* Mich.

Physa plena, sp. nov.

Fig. 3.

Description.—Shell large in size, imperforate, sinistral, globose to globose-ovate. Color light brown to dark straw sometimes tinged with vinous on the body whorl. Whorls 5, convex, last considerable inflated. Spire produced, less so on juvenile specimens. Aperture large, ovate or ovate elliptical, not notable flaring basally. Parietal lip of a moderately strong deposit on the body whorl. Palatal lip thin, marginate. Columella whitish, rather wide, slightly twisted and inclined a little to the left. Sutures impressed, though not deeply, usually margined inferiorly, with a light yellowish straw line. Sculpture of moderately fine growth lines, irregularly spaced, sometimes body whorl strongly malleated. An occasional indication of cross striae. Varicose bands brownish red when viewed from within the aperture, yellow-straw from without.

FIG. 3. *Physa plena* Clench.*Measurements.*

<i>Length</i>	<i>Width</i>	<i>Ap. Length</i>	<i>Ap. Width</i>	
21.	13.	14.	8. mm.	Holotype
22.5	14.5	16.5	8.	Paratype
19.5	13.	14.5	7.5	"
19.	13.	14.5	8.	"
18.5	12.	13.5	6.5	"

Measurements—Continued.

Length	Width	Ap. Length	Ap. Width	Paratype
21.5	13.5	16.5	7.	"
20.	12.5	14.	6.5	"
18.5	12.	14.	6.5	"
18.	12.5	14.	6.5	"
18.5	11.5	12.5	6.5	"
17.5	11.	13.	6.	"
19.	11.5	15.	6.	"
19.	12.5	14.5	7.	"

Holotype.—M. C. Z. no. 51850; and paratypes, M. C. Z. no. 51851, collected at Reed Spring, Centerville, Reynolds Co., Missouri, by P. S. Remington.

Remarks.—A very large species, exceeded in size only among the east American forms by *Physa parkeri* DeCamp. The type series contains the largest examples, though these are only slightly larger than specimens of this species from other localities.

This is an apparent offshoot of *P. hawnii* stock and so far as known, is limited to the northern area of the Ozarkian region.

Physa remingtoni*, sp. nov.Fig. 4.*

Description.—Shell sinistral, imperforate, medium in size, rounded-elliptical. Color rather dark reddish horn, whorls 5, slightly shingled, well rounded. Whorl preceding body whorl decidedly convex. Spire rather short and obtuse.

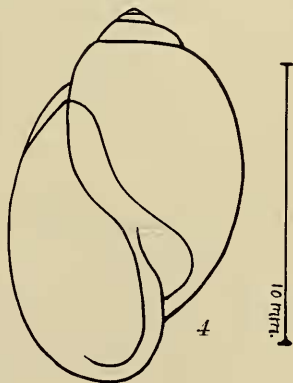


FIG. 4. *Physa remingtoni* Clench.

Aperture rounded-ovate, slightly flaring at the base, proportionately large for the size of the shell. Parietal lip as a very thin deposit on body whorl, usually margined by a fine hair-like line. Palatal lip usually labiate a little below edge, rather thin. Columella whitish, not twisted, inclined slightly to the left, terminating more or less gradually in the body whorl. Sutures only slightly impressed. Sculpture of numerous, more or less regularly spaced fine growth lines. Varicose bands yellowish externally, deep chestnut when viewed from within the aperture. Cross striae usually present but very fine, lacking in all juvenile specimens.

Measurements.

<i>Length</i>	<i>Width</i>	<i>Ap. Length</i>	<i>Ap. Width</i>		<i>Type</i>
13.5	8.	10.	4.5 mm.	U. of M. 32663	Holotype
13.5	8.5	9.5	4.5	Remington 1668	Paratype
13.	8.	9.	4.5	"	"
12.5	9.	10.	5.	"	"
13.	8.	9.	4.5	U. of M. 32664	"
13.	8.	9.	4.	"	"
12.5	8.	9.	4.	"	"
13.5	8.	9.5	4.5	M. C. Z. 50964	"
13.	8.5	9.5	4.5	"	"
12.5	8.	9.5	4.5	"	"
13.	8.5	10.	4.5	Walker 82647	"
12	8.	9.	4.5	"	"
12.5	8.	9.5	4.5	A. N. S. P.	"
12.	7.5	8.5	4.5	"	"
12.	7.5	8.5	4.	U. S. N. M. 362881	"
11.5	7.5	8.5	4.	"	"

Holotype.—Museum of Zoology, University of Michigan, no. 32663; collected at Round Spring, 12 miles north of Eminence, Shannon Co., Missouri, by P. S. Remington, June 7, 1925.

Remarks.—A medium sized species, not readily associated with any other form. Its obtuse spire would seem to place it nearest to *P. microstoma* Hald.

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